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JEL Classification: F32, G21, N24

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> "In the world of finance, the impact of the Eurocurrency system is comparable to that of coke smelting in the development of iron and steel, the steam engine in the development of railways, and the computer in information processing."
> T.M. Podolski, *Financial Innovation and the Money Supply* (London: Basil Blackwell, 1986): 113.

Modern financial theories based on the economics of information suggest that banks arise as a response to existing frictions in the process of acquiring information and making transactions. Bank intermediaries ameliorate such frictions thanks to brokerage (which enhances the matching of borrowers and lenders by overcoming information asymmetries) and portfolio transformation (acting as delegated monitors and providing liquidity insurance). The way banks perform these functions—their 'financial technology'—changed dramatically in the 1970s on a global scale. We define financial technology as a body of knowledge that specifies the whole range of activities creating economic value in financial intermediation, which encompasses product, process and organizational technologies. Financial innovations occur in each of these areas and improve the efficiency with which intermediaries perform their basic functions by expanding opportunities for risk sharing, lowering transaction costs and reducing asymmetric information and agency costs.[1]

The transformations of the 1970s reversed four decades characterized by the absence of significant innovations in the banking industry, as well as by the pervasive regulation of the latter by the state—a regime of financial "repression" or "restriction" articulated in "a set of policies, laws, regulation, taxes, distortions, qualitative and quantitative restrictions, which do not allow financial intermediaries to operate at their full technological potential".[2] An "explosion of financial innovations", both in instruments and strategies, altered radically the features of financial decision making.[3] At the same time, financial intermediaries began successfully to press in favor of a gradual withdrawal of the state as financial regulator. As a consequence, a twofold process of liberation of existing financial technology and, at one time, a rapid shift forward of the

frontier of financial technology characterized the two decades between the late 1960s and the early 1980s. How were financial innovation and financial deregulation related one each other? How did technological change, and in particular information and communication technologies originating mainly outside the financial sector, contribute to this epoch-making shift? And how did technological and institutional changes interact in reshaping the global financial structure?

We explore some of these issues by focusing on possibly the most important and far-reaching change in financial technology that took place around the 1970s: the rise of liability management (aka 'marketization' of banking), a process innovation based on the development of wholesale interbank markets, both domestic and international. This innovation dramatically changed the concept of liquidity in banking, forced banks to implement totally new strategies of active liability marketing, and required a new interactive banking management of the structure of assets and liabilities.

At the origin of such epoch-making change stands the emergence and explosive growth of the so-called Eurocurrency (mostly Eurodollar) banking. The Eurodollar market used to be a most controversial issue. Particularly during the period of financial instability of the late 1960s throughout the 1970s, the astounding expansion of the market raised fierce arguments both of theoretical and political relevance. Under severe scrutiny by both economists and politicians went its capacity of creating potentially unlimited international liquidity, and transmitting inflationary pressures on a worldwide scale. The market was also blamed for its role as a source of funds for speculation and short-term capital movements, with destabilising effects on the international monetary system. It was often regarded as kind of "an unregulated juggernaut 'out of control' " that undermined national sovereignty of monetary authorities and increasingly frustrated their capacity to control domestic money supply. Such debate seemed to generate more heat than light however. The nature of the Euro-dollar market was long considered as an intriguing "mystery story".[4] Even twenty years after their first appearance, some argued that "the size of the external, or Eurofinancial, markets is matched only by the aura of mystery and controversy they have generated", so that "they continue to appear to be an enigma even to those who operate in them continually"[5]. Over time however such aura of mystery, together with general concerns

about its unbridled expansion (and possible sudden contraction), gradually faded away, as many of the old controversies did. As Ralph Bryant later argued, the Eurodollar market has to be considered a key manifestation, but certainly not the only one, of increasing financial interdependence of national economies. In this sense, it contributed to exchange rate instability, transmission of inflation, increased riskyness of financial intermediation, and injured control over monetary and credit aggregates. Still it would be totally incorrect to identify Eurobanking as "the villain chiefly responsible for these problems".[6]

This paper outlines the historical developments of the Eurodollar market from the origins to the early 1980s and their implications for international banks of industrialised countries. Though the Eurodollar market was only one segment of the overall market for Eurocurrencies, its relative size, the dominant influence of its interest rate in determining the structure of Eurocurrency rates, and its role as the core of Euro-business for a large majority of international banks in the 1960s and 1970s justify the choice of focusing on it. As a matter of fact, the dollar-denominated segment was permanently the largest one of the Eurocurrency market, and currency diversification by banks was a function of the degree of confidence in the dollar. Between 1964 and 1984 the Eurodollar market share (i.e. Eurodollars as a percentage of all Eurocurrencies) fluctuated within a range of 72% and 84%, recording a sizeable decline only after 1985 due to the deteriorating value of the dollar. Moreover, the Eurodollar rate and the dollar forward exchange rate have been demonstrated to be the pivotal factors that determined the whole spectrum of Eurocurrency rates.[7]

The paper covers the initial phase of the "Golden Age" of international banking (1960s-1970s), brought to an end in 1981-83 by the global recession that followed the second oil shock, the debt crisis of developing countries and a shift of international finance away from bank intermediation towards financial markets (securitisation). More specifically, the paper argues that the development of the Eurodollar market has to be considered an evolutionary process that induced a transition towards structural change in Western banking. Section 1 defines Eurobanking by presenting a concise outline of its institutional evolution from an international interbank money market to a more complex banking activity involving interrelationships with the emerging

international capital markets. Section 2 briefly reviews some key issues of the theoretical debate as to the nature of Eurobanking (multiplier VS portfolio approach) and its implications for alternatives explanations of the astounding growth rate of international financial intermediation. Section 3 elaborates on the relative importance of real-sector and institutional factors (international trade and business cycle, regulation and capital controls, arbitrage) in different phases of the market's history. Section 4 finally illustrates the role of the Eurodollar business as a factor of structural innovation in Western banking both at systemic level (from regulated, oligopolistic, disintegrated banking systems towards a less regulated, competitive, integrated financial environment) and at microeconomic level ("marketisation" of banking, asset and liability management). Section 5 concludes.

1. The Eurodollar Technology: The Rise of an International Money Market

In the financial jargon of the 1960s "Eurodollar" became the popular name of dollar-denominated short-time wholesale deposits held by banks located outside the USA—foreign branches and subsidiaries of US banks included—principally in European financial centres (hence the prefix "Euro").[8] As such, Eurodollars did not represent any significant financial product innovation: they were merely dollar time deposits that happened to be booked in banking offices outside the USA. Neither was the practice of banking with foreign currency deposits new at all in the old continent. Operations in foreign currency deposits were well known in London before the First World War, and similar transactions denominated in sterling and dollars had been also negotiated in Berlin and Vienna in the late 1920s, before being brought abruptly to an end by the 1931 crisis.[9] Thanks to a gradual relaxation of foreign exchange controls during the 1950s, the practice of taking dollar deposits to finance international trade re-emerged in Western Europe; by 1960 some European banks were well known in international financial circles for actively engaging in bilateral interbank transactions in dollars.[10]

What was really innovative and unprecedented was the creation of a true international market for wholesale dollar deposits, which rapidly established itself as the centre of a network linking all major Western economies. It was after the general

return to external convertibility of all major Western currencies in 1958 that the practice of trading in dollar time deposits gained momentum and scope. Technological innovations in data processing and communications (transactions were arranged over the telephone or by telex) played a critic role in the process. Beyond the impact of technology, however, it was the rapid erosion of information barriers (so that all market participants could get all information available at low cost and agreed on the implications of current information) and the consequent comparative advantages in transaction costs that made it possible the evolution of trading from bilateral to multilateral, from correspondent banking to transaction banking, thus leading to the establishment of an almost perfectly efficient market[11]. At the initial stages, the information pooled by brokers in the City of London was vital, but soon large banks created autonomous units of dealers as a means of improving their ability to monitoring the market's mood.[12]

As far as the market structure is concerned, prime depositors (also indicated as 'lenders') were large corporations (both US and non-US) with international and multinational activities, commercial banks located in main financial centres of the Western hemisphere (including countries beyond the Iron curtain and Arab countries)[13], central banks (mainly out of Europe) and, limited to the early period of the market, international financial institutions such as the Basle-based Bank for International Settlements.[14] Final users (or 'borrowers') were mainly large international corporations, which used Eurodollar short-term facilities as an alternative to finance their international trade. Large commercial banks and other banking institutions located outside the USA, mainly in Western Europe, played as intermediaries between depositors and borrowers. The City of London immediately emerged as the main trading hub. Here the initial dominance of merchant banks and British overseas banks declined rapidly. Due the binding regulation (such as the imposition of a 8% cash reserve ratio and a 28% liquid assets ratio), also UK clearing banks found themselves with a structural disadvantage in Eurobanking until the 1971 banking reform and had to enter the Eurodollar business through specialised wholesale subsidiaries and participation in consortium banks. By the late 1960s foreign branches or subsidiaries (including consortia banks) of major commercial banks from industrialised countries

had already conquered the market leadership, with foreign branches of large American money-centre banks in a dominant position.[15]

As both depositors and borrowers were often resident of countries other than the country in which Eurobanks were located (although in London a sizeable portion of the business occurred among banking offices based in the City), Eurodollar banking is usually defined as external intermediation. Such definition, officially adopted by the Bank for International Settlements and other institutions to provide a statistical representation of Eurocurrency aggregates, is to some extent analytically misleading, in that it suggested that Eurobanking was kind of "special" phenomenon, radically different from "ordinary" banking. In fact, although Eurobanking was the emerging frontier of international financial intermediation since the 1960s, it originated from—and was closely linked to—traditional international banking, either cross-border or cross-currency, mainly channelled through the foreign exchange markets.[16] Moreover, traditional international banking also expanded rapidly and kept providing the largest portion of actual means of international payments—i.e., short-term credits for trade financing and hedging forward against exchange risk[17]. As a consequence, "there is no compelling reason for isolating one aspect of international banking and analysing it independently of the rest of the nexus of financial relations linking nations together".[18]

Important facets of the Eurodollar market were its multi-tier structure and the large portion of business accounted for by interbank dealings. The tiering of the market reflected different creditworthiness and risk assigned by investors to different banks, with large commercial US banks and more generally dollar-based institutions (such as Canadian banks) in the top ranking positions as prime takers at marginally lower rates than second and third-tiering banks. Tiering used to become more pronounced in times of liquidity strains or confidence crisis, such as in 1974 after the collapse of Bankhaus Herstatt (a German bank) and Franklin National Bank (a New York institutions ranging 17th among US commercial banks).[19] A sizeable part of funds allocated in the Eurodollar market operated through interbank redepositing—sometimes also termed misleadingly "pyramiding"—with very narrow spreads (between 0,125 to 0,0625 per cent per annum equivalent) between "bid" rates (the rate at which banks are ready to borrow in the market) and "offer" rate (the rate at which banks offer to lend funds in the

market). This meant that a chain of several banks, whether located in a major financial centre (such as London) or in different countries, could serve as intermediary between original depositors and final borrowers. As shown in Figure 1, the incidence of interbank transactions on total Eurobanking grew from 30 per cent at the mid-1960s to 50 per cent in 1980 of the total Eurocurrency market.[20]

FIGURE 1 HERE

The relative volume of interbank activity turned out to be even larger when figures were limited to BIS reporting countries. In the early 1980s about 70 per cent of foreign currency assets and liabilities (both within-border and cross-border) was accounted for by lending between banks. The figure would be slightly smaller (about 60 per cent) if measured on the base of the "inside area" positions—i.e. positions of reporting area banks vis-à-vis banks in major financial centres, which represented the "hard core" of interbank market.[21] It is worth noting also that a substantial part of interbank business in the 1970s and 1980s was "inter-office", as it took place between offices of the same bank: a practice that enabled large multinational banks to internalise the functions of the interbank market.[22]

The enlarging scope for interbank dealings provided the base for the emergence and the expansion of Eurocapital markets. Since the early 1970s, a rapidly increasing demand for medium- and long-term dollar loans by large international corporate and sovereign borrowers induced Eurobanks to extend the maturity of part of their lending business.[23] Fixed-interest loans with medium-term maturity (2-3 years) provided by individual Eurobanks in the early phase of the Eurocredit market gave soon way to innovative bank products such as flexible term-loans with longer maturity (stretching up to 4-to-8 years). These credits were provided at floating rate on a roll-over basis (determined as a fix spread over the costs of funding in the market and adjusted every three or six months to prevailing short-term Eurodollar interbank rate, or LIBOR) by specialised institutions such as consortia banks or by international bank syndicates, sometimes under the co-ordination of merchant banks.[24] The Eurocredit market was closely linked to the Eurodollar market, since Eurobanks secured in the latter a large

amount of funds used to finance their Euroloans portfolio. Occasionally, when short-term interest rates turned higher then long-term rates, borrowers used to temporarily redeposit part of the proceeds of syndicated loans, pending use, in the Euro-money market. The Eurodollar market had also important links with the Eurobond market, where international bank syndicates engaged in managing, underwriting and placing bonds issued by corporate and sovereign borrowers.[25] In fact, investment banks, securities firms and commercial banks acting either as managers of new Eurobond issues or market makers of the secondary market financed part of their underwriting commitments by borrowing in the Eurodollar and other Eurocurrency market.[26]

2. Understanding The New Technology: Multiplier vs Portfolio Approach

From its origins to the early 1980s, and in spite of occasional and short-lived setbacks, international banking as a whole expanded at a breath-taking pace both in volume and scope (as shown in Figure 2).

FIGURE 2 HERE

Figures reported in Table 1 show that the gross size of the Eurocurrency market, traditionally measured as the outstanding external positions (i.e., foreign currency liabilities or assets vis-à-vis non-residents) of reporting banks in 15 OECD countries and other selected Eurocurrency offshore centres grew at an average annual compound rate of 26 % in the period from 1964 to 1985, passing from $ 20 to 2,600 billion equivalent (at current prices and exchange rates).[27] Even when adjusted in order to allow for double-counting arising from interbank operations (i.e., growth of net size)[28] as well as the secular upward trend of inflation, those figures remain striking.[29]

TABLE 1 HERE

Their growth rate largely outpaced that of domestic banking, and showed a slow-down only in the early 1980s as a consequence of both short-term factors (the global recession and the debt crisis of developing countries) and structural changes such as the

adoption of more prudential attitudes by international banks and general displacement of international bank credit due to increasing “securitisation”.

What explains such remarkable performance? Why did banks expand so rapidly their external intermediation? This question became a key issue of the original Eurodollar debate. Early attempts to explain the growth of the Eurodollar market pointed to the existence of an endogenous credit creation process.[30] Theoretical investigation was urged by widespread concerns as to what was regarded as a potentially unconstrained ability of the market to create credit with global inflationary consequences. According to the multiplier hypothesis, Eurodollar growth was supposed to be a function of some credit or deposit multiplier because a proportion of funds lent out by banks to non-bank borrowers was redeposited with them. This implied that the Eurobanking system could be compared to a certain extent to a domestic banking system based on fractional reserves. Such hypothesis however proved less than satisfactory, since it tended to misrepresent basic institutional features of Eurobanking and was unable to reach clear-cut conclusions. No Eurobanking system existed as such as a closed or autonomous system (since it was an open system linking national systems together), and Eurobanks used to hold reserves not with central banks but with other commercial banks. Moreover, the overly attention paid to original lenders and final non-bank borrowers overlooked the critical importance of interbank market. At the same time, empirical estimates of the actual base of the multiplier and the size of the multiplier itself proved both difficult and subject to large discrepancies. Finally, redepositing by non-banks suffered substantial leakage towards national systems, so that the multiplier, if any, could be in any case only a minor factor of Euromarket's growth.[31]

Severe inconsistencies of multiplier models were mainly emphasised by supporters of a different view, the so-called “portfolio approach”. Moving along the lines drawn by Gurley and Shaw and Tobin, the “new view” set an original theoretical framework in which banking (and non-banking) intermediaries and primary securities markets were seen to compete for deposits and loans by issuing liabilities and purchasing claims from borrowers. Thus their ability to expand their balance sheet (i.e., their stock of assets and liabilities) depended ultimately on the portfolio

preferences of wealth-holders, influenced in turn by particular attributes (relative return, riskiness, liquidity) of the liabilities issued.[32] Portfolio approach has proved particularly helpful in shedding light on both the nature and the operating mechanism of Eurobanking. First, it has correctly emphasised that Eurodollars, as short-term yield-earning time deposits, did non represent "money" in its narrowly defined sense (i.e., means of payment)[33], although like other money market assets with a high degree of liquidity they could be considered as "near money" (close substitutes for money held in anticipation of payments and readily liquidated). Since Eurodollar deposits were close though imperfect substitutes of domestic deposits and money market assets, Eurobanks could expand their balance sheets by competing with other intermediaries and markets in attracting dollar funds from wealth-holder.[34] Thus, credit expansion in the Eurodollar (external) market – as a time-deposit system fundamentally different from a checking account system – was made possible by a process of substitution of near money for money (increased velocity of a given stock of money) that occurred within a growing world-wide dollar-denominated credit market. As Gunter Dufey and Ian Giddy put it, the market was "a growing slice of an expanding pie".[35]

3. Explaining Eurodollar Innovation: Real Factors vs Deregulation

The strong theoretical appeal of the portfolio approach derives primarily from the fact that, by shifting attention towards institutional features of the system, it contributed to bring to light new factors such as the interest rate linkages between domestic and external markets, the fundamental role of the Eurodollar market as a channel for international capital flows, and the economic forces behind supply of deposits and demand for loans. As a consequence, explanations of the growth of the market have paid an increasing attention to the impact of real-sector forces (business cycle, credit conditions) and to institutional factors, such as arbitrage and regulation, which affected the banks' behaviour in the market.

Real-sector-led explanations of the market's growth point to the expansion of international trade (and to the increasing multinationalisation of industrial companies) as the main driver of international financial intermediation, and view cross-border financial activity as the financing counterpart of trade or intracompany transactions.[36]

As a matter of fact, early theoretical interpretation of the Euro-currency market also focused on trade influences (the need to maintain working balances in foreign currencies, and particularly in dollars for the financing of international trade), suggesting that high transaction costs involved in moving between domestic and foreign currencies had encourage traders to hold balances denominated in international currencies. Subsequent econometric research provided further evidence of a relationship between Eurocurrency deposits and the growth of international trade, arguing that the international holdings of currencies were related to trade transactions. More specifically, Eurodollar deposits acted as substitutes for forward exchange contracts, since transaction cost advantages existed in making a large spot purchase of dollars and investing it in the Euro-markets at different maturities to coincide with payments abroad rather than making a number of forward contracts.[37]

Among real-sector factors, large demand for Eurocredits by corporate (included state-owned companies) and sovereign borrowers with large investment programmes proved a driving force behind the expansion of the market since the late 1960s. A further shift followed the oil shocks of 1973 and 1979 due to increasing demand for external finance by governments of industrialised and developing countries, matched by petro-dollar recycling (the channelling through the Euro-markets of the cash surplus of oil-exporting countries).[38] (See Figure 2 again) As far as Eurobanking can be considered a satisfactory proxy for international banking as a whole, however, also the growth rate of its net size (i.e., excluding interbank redepositing) demonstrates that international financial intermediation expanded at a remarkably faster pace than world output and international trade from 1964 to 1985 (see again Table 1)[39]. Some other factors have therefore to be considered.

Among these, all studies dealing with the economics of the Euromarket unanimously emphasised the lack of regulatory constraints as a crucial factor for its expansion.[40] Both in the USA and in Western Europe domestic banking was subject to tight regulation, either imposed by national monetary and supervisory authorities, mainly in the form of discriminatory credit allocation, reserve requirements, interest rate ceilings on deposits and loans, prudential capital-to-asset ratios, barriers to entry, market segmentation, or enforced by private interbank cartel arrangements. Compared

with the modest opportunities for growth offered by domestic intermediation, the Eurodollar market in London – where British monetary authorities guaranteed free access and allowed foreign currency business of both UK and foreign banks to develop outside binding regulation imposed on the domestic (sterling) sector, as a means of reviving the role of the City as an international entrepôt centre[41] – was conspicuous for its totally unregulated and competitive nature. Moreover, in spite of the gradual relaxation of exchange controls after the return to external convertibility in 1958 (which actively contributed to the booming Eurodollar market), the widespread presence of capital controls—until 1973 in the USA and West Germany, until 1979 in the UK, well beyond the 1980s in France and Italy[42]—imposed additional costs on international financial transactions[43] and limited to some extent the expansion of banks' international business. Similar regulatory discrimination had also an impact on different segments of the Euromarkets. The absence of government and foreign exchange authorities controls, less detailed offering prospectus, tolerance for scarce attitude to disclosure and fiscal exemptions, together with low interest rates and underwriting costs and substantial economies in transaction costs (relative to raising capital piecemeal in each individual country), prove critical factors that accounted for the rapid expansion of Eurocapital markets.[44]

During the 1960s and 1970s Eurobanking, harmed by regulatory constraints when conducted from home-based head offices, was therefore increasingly attracted into entrepôt financial centres such as London and Luxembourg or small offshore centres. Banks interested in an internationally- and growth-oriented strategy successfully circumvented domestic regulation and tax regimes by developing a multinational structure, thus increasingly moving external intermediation—which turned out to be sometimes purely domestic intermediation in disguise[45]—out of their domestic jurisdiction (see Table 2).

TABLE 2 HERE

Also related to the growing internationalisation of banking was an increasing presence of foreign banks in New York and other US banking centres. This was mainly

motivated by their desire to gain direct access to the US domestic market. Additional incentives were provided before 1978 by a regulatory discrimination in favour of foreign banks relative to US banks.[46] These were reinforced by the introduction in 1981 of International Banking Facilities, which lifted regulatory constraints on international business of banks in the US (either domestic or foreign), thus enabling for the first time New York to compete with London in attracting Eurobanking.[47]

The overseas expansion of American banks was particularly striking. Only 8 US banks were operating overseas branches in 1960; they had become 163 in 1984.[48] Multinationalisation of American banking was actively though involuntarily promoted by US government and monetary authorities through monetary policy and balance of payments control programs. During the credit crunches of 1966 and 1969, the use of binding regulation (in the form of interest rate ceiling on interest rates payable on time deposits and negotiable Certificates of deposits – the so-called Regulation Q) induced American banks to resort to the Eurodollar market through their London-based and overseas branches in order to channel these funds back to the USA.[49] By doing so, they successfully opposed to disintermediation threats brought home by both Eurobanks and new competing domestic money markets (such as that on commercial paper). In the same period heavy bidding for Eurodollars by US banks was also a consequence of rising demand for Eurodollar loans from US corporations' subsidiaries in Europe, since voluntary and mandatory capital control programs enforced by the Johnson administration limited their parents' ability to transfer funds out of the USA and curbed US banks' lending abroad. Such factors exerted a major expansionary impact on the Eurodollar market, which accounts for its extraordinary growth rate in the second half of the 1960s.[50]

Demand from US banks and corporations however rapidly declined after 1970 when US monetary authorities relaxed monetary policy, discouraged Eurodollar borrowing by imposing marginal reserve requirements on borrowing by parent banks from their overseas branches and enhanced the competitiveness of the domestic market by lifting Regulation Q ceilings on large deposits and CDs. Moreover, the shift towards financial liberalism promoted by the Nixon administration led in 1974 to the removal of the capital controls introduced in the 1960s[51]. However, in spite of a marked decline in

the forces that had fostered the market's growth, Eurobanking kept expanding. This apparently paradoxical result shifts our attention to other forces (beyond real-sector developments and regulation) of critical relevance for the market's growth as well as for its working: the structure of interest rates and the arbitrage process.

Historical series give empirical evidence of strong covariance of interest rates in the Eurodollar market and in the USA. Even more significantly, the Eurodollar rate also commanded a permanent premium both on bank time deposits and relevant money market instruments, as shown in Figure 3, which illustrates the trend of Eurodollar and relevant US money market rates and the nominal differential between LIBOR and the nominal interest rate on 3-month CDs in the USA. [52]

FIGURE 3 HERE

This close concordance of Eurodollar and US rates variations suggests the existence of a causal relationship between monetary conditions in the USA and the Eurodollar interest rate.[53] This can be partly accounted for by the relative size of the US money market and monetary aggregates as compared to the Eurodollar market and the absence of currency risk. Recent literature on the economics of the Euromarkets however agrees upon crediting both premium and covariance to increasingly efficient arbitrage.[54]

Under such respect, the revolutionary impact of innovations in communication technology on banking has to be stressed time and again. The technology-led revolution in the delivery of financial services (information processing and transmission, confirmation of transactions, electronic funds transfer and accounting) critically contributed to reduce economic distances between national financial systems. This dramatically enhanced the responsiveness to opportunities for cross-currency and cross-border arbitrage both by suppliers of funds (cross-border and currency ladling in search for higher expected yields on foreign financial assets) and final users (borrowing funds internationally to profit from more favourable loan terms than those available domestically). [55] Banks were particularly well positioned to exploit such profit opportunities as a major vehicles for information about foreign financial systems. Such privileged position was further enhanced by the general trend towards multinational

banking (mentioned above), which gave banks direct access to information, arbitrage and intermediation activities in foreign and international markets.[56]

The arbitrage process represents the key-factor of supply-and-demand models of the Eurodollar market based on interest parity theory and portfolio adjustment by depositors, borrowers and intermediaries.[57] Such models emphasise the role of the market in the process of financial integration as a channel for short-term capital movements as well as the role of the Eurodollar rate as the focal price in an increasingly interdependent financial system.[58] In fact the emergence and growth of Eurobanking can be principally accounted for by the emergence of new international arbitrage channels. For dollar-holding investors (either US or non-US resident), an American bank or the US money-markets were natural outlets for their funds, as well as for dollar borrowers an American (or at least dollar-based) bank was the natural source of lending. Thus, apart from depositors in search for anonymity (for political, fiscal or other reasons) and assuming factors such as familiarity, business hours and communications to play a marginal role in a market where transactors were large banks, public entities and international corporations with advanced communication technology, Eurobanks had to offer competitive conditions in order to compete with US banks. This implied offering higher returns on dollar time deposits (thus increasing the attractiveness of Eurodeposits relative to US time deposits and other money market assets) and charging lower interest on Eurodollar loans relative to standard lending rates (prime rate) in the USA.

As a consequence, Eurobanks operated permanently on a narrower spread than banks in the US domestic market and in most part of national markets. As said, profit in interbank business could result as small as 1/8 of one point per cent or even less, although it was substantially higher in medium- or long-term lending to non-bank borrowers. Still Eurobanking was profitable due to its institutional features. Eurodollar borrowing by banks was in fact exempted from reserve requirements and other regulatory constraints; administrative costs were low (because of economies of scale) and transaction and information costs only marginal, thanks to communication technology and an efficient brokerage system[59]. Eurobanks were therefore prepared to

shift most benefits of lower operating costs to depositors and borrowers in the form of higher returns on deposits and lower rates charged on loans respectively.

The ability to attract depositors and borrowers out from the US domestic market to the external market through arbitrage channels was therefore the key-factor in the continued expansion of Eurobanks' business. Under favourable conditions and in the absence of binding capital controls, moreover, they could also induce cross-currency arbitrage, attracting depositors and borrowers from non-US markets in search for higher returns and better conditions than those obtainable domestically. A sizeable though minor part of Eurodeposits came in fact from Western European investors switching out from domestic currencies into Dollar positions, when the differential between the Eurodollar rate and domestic rates, adjusted for covering against exchange rate risk, proved profitable.[60]

Beyond the creation of new arbitrage channels for depositors and borrowers, however, Eurobanks have also to be analysed as arbitrageurs themselves. A number of analytical studies have suggested arbitrage induced by banks' portfolio-behaviour (rather than by depositors) to account for the covariation of Eurodollar and US rates.[61] As a matter of fact empirical analysis of the determination of the Eurodollar rate demonstrated that, in the absence of restrictions on free flow of capital, Eurocurrency rates have been tied within narrow margins to the level of US money market rates by the arbitrage activity of US banks in the efficient interbank market. Incentive to Eurodollar arbitrage was provided by the fact that Eurodeposits, as reserve-free substitutes of domestic bank deposits, in a fashion similar to other non-bank innovations such as repurchase agreements, money market funds, and commercial paper, allowed banks to reduce their overall holdings of reserve, thus providing "avenues for the growth of credit that are not directly constrained by the supply of reserves to US banks"[62]. Arbitrage took mainly the form of balance-sheet-expanding outward arbitrage, which implied raising funds in the US CDs market (or in the commercial paper market through bank holding companies) and moving them offshore to invest them at a slightly higher return with Eurobanks, until domestic and external interest rates adjusted to remove arbitrage incentives or banks reached internal arbitrage constraints (such as perceived risk, capital-to-asset and return-on-assets ratios).[63]

Eurodollar arbitrage made the domestic and external dollar money market increasingly integrated and efficient, thus tending to limit the interest rate differential.[64]

The existence of large interest rate differential between Eurodollar and domestic time deposits for long periods in the history of the market, especially in the second half of the 1960s and early 1970s, as Figure 3 shows, may cast doubts on the efficiency of bank arbitrage to maintain interest parity. However, other factors have to be taken into account. One was the impact of US capital controls and bank regulation up to the early 1970s. As a matter of fact, during the 1966 and 1969 credit crunches New York banks borrowed heavily on the Eurodollar market through their European branches, whereas Regulation Q ceilings prevented free adjustment of domestic CDs rates to rising Eurodollar rates.[65] Eurodollar arbitrage was moreover impaired by capital controls that prohibited US banks to export abroad funds raised domestically, and tight credit conditions in the US account also for the Eurodollar rate to remain mainly above prime rate until the early 1970s. Unusually large Eurodollar differentials therefore reflected increased market segmentation. After this exceptional period, however, easing of monetary policy by the FED and the removal by the Nixon administration of Regulation Q ceilings on CDs in 1970 made the US domestic market more competitive. With gradual relaxation of capital controls (lifted at the end of 1973), interest-rate linkages between the internal and the external sectors were strengthened, US banks turned into net lenders to the market and the arbitrage process became much more efficient, responding to even marginal changes in liquidity and interest rate. Figures in Table 3 suggest that this was reflected in a clear trend towards a structural reduction in the interest differential between the Eurodollar and the US money market.[66]

TABLE 3 HERE

In explaining the Eurodollar differential, changes in perceived risk have also to be taken into account. Depositors used to consider Eurodollars deposits structurally riskier than US deposits, since they were uninsured, held by banks with no direct access to the FED discount window, and located outside the legal jurisdiction of the USA. Moreover, riskyness varied from bank to bank: deposits placed with European branches of large

American banks were almost perfect substitutes of domestic deposits, whereas the "tiering" of the market reflected differences in risk associated with different categories of banks. Finally, perceived risk was also influenced by rumours of government intervention (mostly in the form of additional regulation, since vulnerability to sovereign risk stemming from restricted transferability or blocking of repayments was generally regarded as unlikely), confidence crisis—such as the already mentioned episodes of 1974 involving Herstatt Bank and Franklin National Bank—and increasing instability of the international monetary system (such as the rising concerns about dollar exchange rate deterioration throughout the 1970s).[67]

Over time however changes in the perception of Eurodollar risk by agents may have contributed to a structural reduction of differential. While rapid dissemination of both theoretical and practical knowledge of the Euromarkets eroded information barriers to arbitrage, the resiliency of the market itself throughout the financial turmoil of the late 1960s and early 1970s, in spite of recurring worries within international banking circles about the possibility of its sudden contraction, disappearance or collapse, allowed depositors to gradually downgrade the additional perceived risk. After the crisis episodes of 1974 raised the alarm, most banks autonomously upgraded internal controls and extended their responsibility for branches and affiliates' exposure under the so called "principle of corporate liability" typical of the US legal tradition.[68] At the same time, as a result of closer co-operation among central banks within the BIS, epitomised in the Basle declaration of 1974 on lender-of-last-resort assistance to the Euromarkets in the case of liquidity crisis, and the 1975 supervisory guidelines known as the "Basle Concordat", monetary authorities enforced improved monitoring and tighter prudential supervision.[69] After two decades of development, large liquidity (as a direct function of size), increased integration, closer substitutability and the full manifestation of the information effect (i.e., the fact that market participants had to complete a learning curve to adjust their portfolio strategies) made Euro-markets even more attractive to both depositors and borrowers, who perceived the risk of conducting business in the external markets only marginally greater than in national markets. This is likely to have contributed to a secular decline in the interest-rate incentive required to

attract depositors and borrowers from the domestic to the external market, thus making the arbitrage schedule more elastic[70].

4. Eurodollars and Structural Innovation in Banking: The Shift to Liability Management

The revolutionary impact of the Eurodollar market on Western financial systems could hardly be overemphasised. As a matter of fact, Eurobanking proved a factor of epoch-making structural change of banking in industrialised countries. In a traditional world of closed and disintegrated national systems, dominated by regulation, oligopolistic structure and collusive behaviour, barriers to entry, market segmentation and lack of innovation, suddenly a fast-growing unregulated enclave of wholesale business emerged, based on international integration, free access, keen market competition and technological as well as financial innovation. Eurobanking represented therefore to large commercial banks of Western countries, which generally enjoyed little scope for domestic expansion, an unprecedented and largely unexpected opportunity for growth. Such opportunity however brought with it also major challenges.

Up to the mid-1960s, risk implied in engaging in Eurodollar remained low and Eurocurrency banking was a fairly simple business that could be easily run by banks through their traditional international functions, normally a small department that offered services related to trade finance and dealt with correspondent banks. Over time commercial banks learnt how to use the international interbank market also for domestic purposes, that is, to adjust their reserve position in domestic currency, to back loans to corporate customers (both in national or foreign currency), to support and make less dependent from national regulations their traditional foreign-exchange banking activities and to undertake covered interest arbitrage in the foreign exchange market (i.e., covering in the Euro-dollar market forward transactions undertaken on behalf of corporate customers). Eurodollars were also increasingly used by banks in forward calculations, thus enhancing their ability to deal in foreign exchange transactions. Currency risk remained modest, and so was liquidity risk, due to the prevalence of interbank business and short-time self-liquidating transactions with non-bank borrowers[71].

The 1970s however brought home an abrupt shift in riskiness. Increasing multinationalisation implied the implementation of efficient procedures to monitor and control a growing number of foreign branches and subsidiaries, usually responsible for sizeable business, although leaving them adequate scope for independent decisions. Volatile exchange rates increased currency risk, as a larger share of balance sheet denominated in foreign currencies created scope for exchange fluctuations to cause sizeable losses. This forced banks to develop more sophisticated procedures for monitoring and controlling currency exposures. Even more importantly, a secular rise in the level of interest rates compounded by unusual instability sharpened interest risk also, as sudden fluctuations in the cost of funding risked to severely affect profits from loans of longer maturity at fixed rates.

At the same time, the emergence of the Eurocredit business, the fall in lending margins (caused by the reversal of US banks' borrowing which left the market with high liquidity and excess banking capacity), keener competition, a general lengthening of credit maturities and the expansion and diversification of medium-term lending to sovereign borrowers contributed to substantially change the pattern of the Euromarkets activity. As a matter of fact, by funding loans of long contractual maturity through short-term deposits, as well as mismatching or short-funding rollover deposit maturities in order to increase the profit yielded, international banks found themselves increasingly engaged in net liquidity creation.[72] Actually all investigations on London Eurobanks, though adopting different methodologies, have provided clear evidence—briefly summarized in Table 4—of increasing positive maturity transformation, and hence of net liquidity production.[73]

TABLE 4 HERE

As a consequence, growth-oriented commercial banks were urged to develop new functions of liquidity management. Since Eurodollar borrowing by banks (a part from US prime-takers) usually relied upon small core deposits and was extensively financed in the interbank market, liquidity management functions on a cash flow basis became vital to ensure that maturing deposits could be repaid from the proceeds of maturing

assets or replaced by fresh borrowing. Reliable access to wholesale market funding became then a crucial factor for Eurobanking: in this phase, therefore, 'marketisation'[74] meant essentially developing an efficient dealing room function in order to fund the expansion of international business through managing Eurodollar liabilities. At the same time banks proved reluctant to absorb the interest rate risk associated with rate volatility. The introduction of marginal pricing in roll-over lending at floating rates was an effective response in terms of active asset management which adjusted assets to potential liabilities and separated interest risk from liquidity risk – although shifting interest risk to borrowers could harm the latter's ability to service their debts, thus eventually turn into greater credit and default risk for banks (though shared with all participants in the syndicates)[75].

The new concept of banking based on managed liabilities was bound to prove a far-reaching structural innovation. Unlike in traditional banking, where liability management was confined to a few long-run strategic decisions, banking in the Eurodollar system urged banks to implement totally new strategies for actively marketing liabilities and funding their growth by tapping wholesale financial markets. This implied a radical change in the nature of bank liquidity. The traditional concept of a portfolio of liquid assets (reserves, government securities) that could be turned into cash at short notice and on predictable terms (by redemption, sale or use as collateral for borrowing) was increasingly integrated by a new concept of liquidity based on issuing new liabilities to raise cash in financial markets. In Eurobanking the principle of a new interactive banking management of the structure of assets and liabilities found its first materialisation. Eurobanking can therefore be considered the initial breakthrough of a transition towards an integrated management system based on matching assets and liabilities as to maturities, currencies and interest rates. Although in the 1960s-70s this process was mainly limited to international business of top commercial banks of industrialised countries, in recent periods bank intermediation undertaken on market-determined terms became an emergent feature of domestic financial systems[76].

American banks pioneered this new way of banking. Eurodollar borrowing by US banks in the late 1960s was a pioneering experience of liability management, although the revival of the Federal funds market in the 1950s and the emergence of the

market for bank certificates of deposits and commercial paper in the early 1960s can be regarded as equally crucial innovations [77]. However, it was the deepening and globalising of the interbank market that made it possible to such structural change to have global implications. Eurodollar interbank trading – whose efficiency was greatly enhanced in the 1970s by the establishment of international, interconnected private clearing systems such as CHIPS and SWIFT, and new advanced information services offered to interbank traders by Reuters and Telerate [78] – performed four critical functions that allowed the market to absorb external shocks and continue to expand: 1) Liquidity smoothing. The stock of interbank liquid assets acted as a buffer between the inflow and outflow of funds from deposits and loans, thus reducing transaction costs by economising on the volume of precautionary balances; Eurobanks held in fact very small reserves (in the form of negotiable assets), sometimes supplemented by stand-by facilities from US banks. 2) Liquidity transfer. As deposits of non-bank suppliers were channelled mainly to banks of high name, size and credit standing, the latter acted as main intermediaries of the rest of the interbank system. 3) Currency transfer. This enabled banks to match the currency composition of their assets and liabilities through interbank trading – an important function in the light of innovative bank products such as multicurrency trade facilities and eurocredits with multicurrency options. 4) Finally, global liquidity distribution, which compensated excess demands and supplies between the Euro-currency centres and a large network of local markets – turning the Eurodollar and Eurocurrency markets into a true global phenomenon[79].

5. Conclusion

Between 1960 and 1980 international finance went through a true revolutionary process. This paper contended that the emergence of Eurodollar banking lies at the very heart of such epoch-making structural change in financial technology, and tried to disentangle the "prime movers" behind it.

Usually technological change, especially in the field of information and communication, is given a key role among the determinants of recent changes in the financial structure, mainly due to its impact on transactions costs and information asymmetries.[80] The Eurodollar story is not an exception under this respect, and this

paper paid attention to the role plaid by technological factors. There is little doubt that the fast growth of the international money market would have been impossible without the fall in transaction and communication costs and information barriers allowed by the emergence of a new global information and communication infrastructure. The key development from this point of view was certainly the spread of telex networks as the main medium of intra- and inter-firms communication. Telex increased the speed and volume of transactions among international banks and favoured the erosion of information asymmetries between market participants. Together with later developments such as electronic storage and transmission of data, the global communication network was at the roots of new management information systems which enhanced both speed and volume in the transmission and processing of information within business organizations, both banks and non-banks. Since the late 1960s, these technologies enhanced the emergence of new forms of business intelligence and management through which both financial intermediaries and corporate organizations increasingly monitored liquidity and took decisions about managing risk and raising capital on a transnational or even global scale. Beyond this first-order impact, information and communication technologies also contributed to increase the liquidity and marketability of financial products related to the Eurodollar system, and favoured competition among financial intermediaries, which also had an impact on the growth of the market.

This paper suggested, however, that beyond purely technological factors, institutional changes were the critical elements that made Eurodollar banking such a revolutionary innovation. Under this respect, regulatory arbitrage was a key element in the process of internationalization of financial intermediaries. Likewise, international asymmetries in capital and exchange controls as well as in monetary policy-making created huge and systematic profit opportunities from cross-border and cross-currency arbitrage in the money markets. This eventually generated the most radically innovative characteristics of Eurodollar banking, namely the development of active liability management. This structural change was bound to have profound implications also for the conduct of monetary policy, as it contributed to undermine the ability of monetary

authorities to control—and even measure—monetary aggregates, and fostered the transition to inflation targeting as main monetary policy rule.

Since the 1980s the process of financial innovation set in motion by the Eurocurrency system gained further momentum. The debt crisis of developing countries and the global economic recession paved the way to a marked slowdown in Eurocurrency banking growth rate. Many banks were then thought to have reached a ceiling as to the internationalisation of their assets and liabilities portfolio, especially in the light of repeated warnings by supervisory authorities against excessive reduction of capital ratios. The removal of capital controls as well as more efficient arbitrage and ever-intense competition further reduced the already narrow margins of Eurobanking, while demand for Eurocredits was declining relative to emerging securitisation.[81] As a consequence, whereas in the 1960s and 70s liability management had been mainly "asset driven" (i.e., liabilities were managed to allow banks to expand asset portfolios), in the 1980s banks abandoned their strong growth-oriented strategies. A more selective attitude as to profitability and asset quality was then accompanied by a diversification of funding sources to reinforce the capital component of banks' liability side (floating-rate notes, note issuance facilities). Innovative strategies were also pursued that aimed at exploiting fee-generating business with no expansion of balance sheet, engaging in dealing of derivatives (such as currency and interest swaps) or assisting customers in their issues of Eurocommercial paper and Euronotes with syndicated and back-up facilities, stand-by credit lines, guarantees (i.e., commitment banking). Moreover, direct use of financial derivatives enabled banks to hedge more efficiently against price risk through off-balance sheet operations. Eurodollar contracts quickly became the most significant instruments traded in Chicago and London in terms of open-interest positions, and also the contracts which banks participated most actively in. Both US and non-US banks became used to take net long positions (net purchases) in Eurodollar futures to hedge against their acceptance of Eurodollar deposits as a more efficient substitute for interbank transactions, mainly because futures positions were not reflected in the banks' balance sheet, thus reducing the constraint imposed on banks by market and regulatory constraints on capital ratios.[82] These later developments in financial engineering, directly related to new information and communication

technologies, are usually regarded as the “core” of the financial revolution of the late 20th century. This paper argues that the revolution started much earlier and was driven less by technological factors and more by institutional changes.

* * *

TABLES AND FIGURES

Table 1
International banking, trade and world output

	1964-72	1972-80	1980-85	1964-85
International banking (net)[1]	33.6	26.7	12.9	25.8
International banking (gross)[2]	34.0	28.6	10.8	26.1
International Trade[3]	12.0	21.2	0.4	12.4
World Output[4]	9.6	15.0	4.7	10.4

NOTE. Compound annual growth rate (per cent).

1 BIS series for net size of Eurocurrency market (excluding interbank redepositing among banks in the reporting area) of Eurocurrency market; data from BIS. BIS reporting area included only G10 countries in the 1960s and early 1970s and was gradually extended to cover all European countries and US banks' branches in selected offshore centres.

2 Morgan Guaranty series for gross size of Eurocurrency market (including interbank redepositing). Differs from the BIS series since it defines the reporting area to cover a larger number of countries and banks.

3 International trade in goods and services (world excluding Soviet bloc); data from IMF.

4 Gross domestic product (world excluding Soviet bloc); data from IMF.
Source: Bryant (1987): 22.

Table 2
Foreign Banks in Selected OECD Countries, 1960-1981

Host Country	1960 banks[1]	1973 banks[1]	1981 banks[1]	1960 assets[2]	1973 assets[2]	1981 assets[2]
United Kingdom	51	129	229	Ö	Ö	60.2
West Germany	24	77[3]	148	0.5	1.4[3]	3.6
France	33	76	131	7.2	14.1	17.4
Italy	2	15	38	Ö	Ö	2.3
Belgium	14[4]	38	56	8.2[4]	28.6	46.8
The Netherlands	...	27	40	Ö	Ö	18.0
Luxembourg[5]	3	56	102	8.0	77.6	85.5
Switzerland	8[6]	99	107	Ö	11.4	11.6
USA	...	124	459	Ö	3.4	13.4
Japan[6]	34	38	94	Ö	1.6	2.5

1 Number of foreign banking organisations operating in the country through branches or majority-controlled subsidiaries (year-end data).

2 Foreign banks' assets as a % of total assets of all banks operating in the selected countries.

3 1970.

4 1958

5 Belgian-owned banks excluded.

6 Foreign branches only.
Source: Pecchioli, 1983.

Table 3
Interest differential between the Eurodollar(1) and US markets(2)

	Pre capital control (1962-1965)	Capital control (1966-1973)	Post capital control (1974-1985)
Number of observations	48	96	144
Average differential (in basis points)	66	103	66

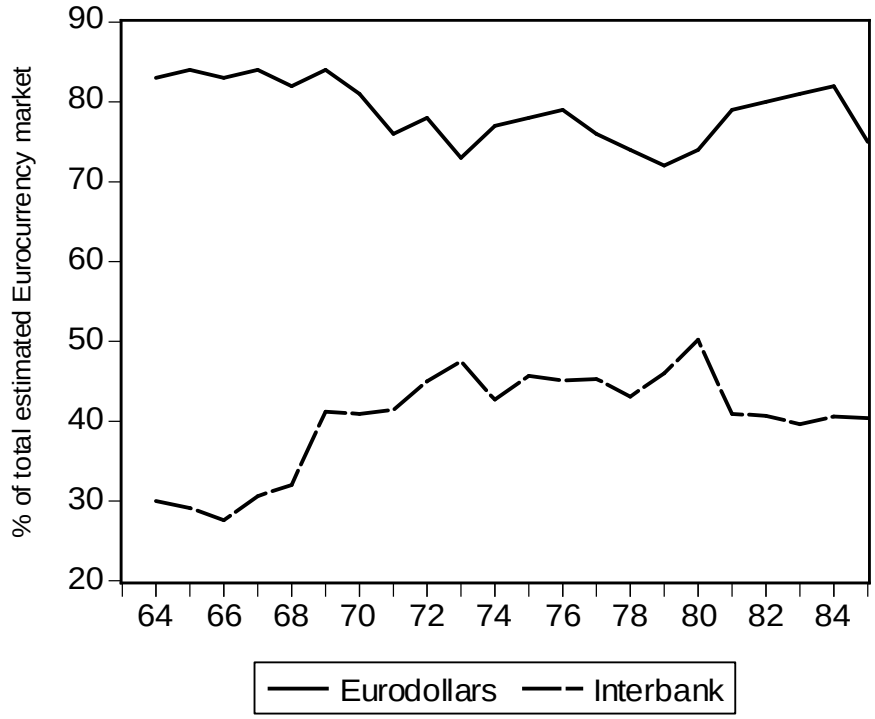
(1) LIBOR (London interbank offer rate) on 3-month Eurodollar deposits
(2) Nominal interest rate on 3-month US Certificates of deposits
Source: OECD Monetary and Financial Statistics

Table 4
Maturity Analysis of all London banks
Liabilities and claims by maturity as % of total liabilities and assets in foreign currencies

	<8d liabs-claims	8d-<1m liabs-claims	1m-<3m liabs-claims	3m-<6m liabs-claims	6m-<1y liabs-claims	1y-<3y liabs-claims	=/>3y liabs-claims
1973[1]	19.1-14.9	19.5-18.8	26.2-24.8	20.9-20.9	8.8-8.2	2.5-4.8	3.1-7.8
1980[1]	21.1-16.3	18.9-15.3	27.9-23.1	19.7-16.7	7.5-7.4	3.2-6.6	1.7-14.6
1985[1]	22.4-16.4	21.0-16.4	27.2-22.1	16.9-14.4	6.2-6.5	2.6-6.8	3.8-17.4

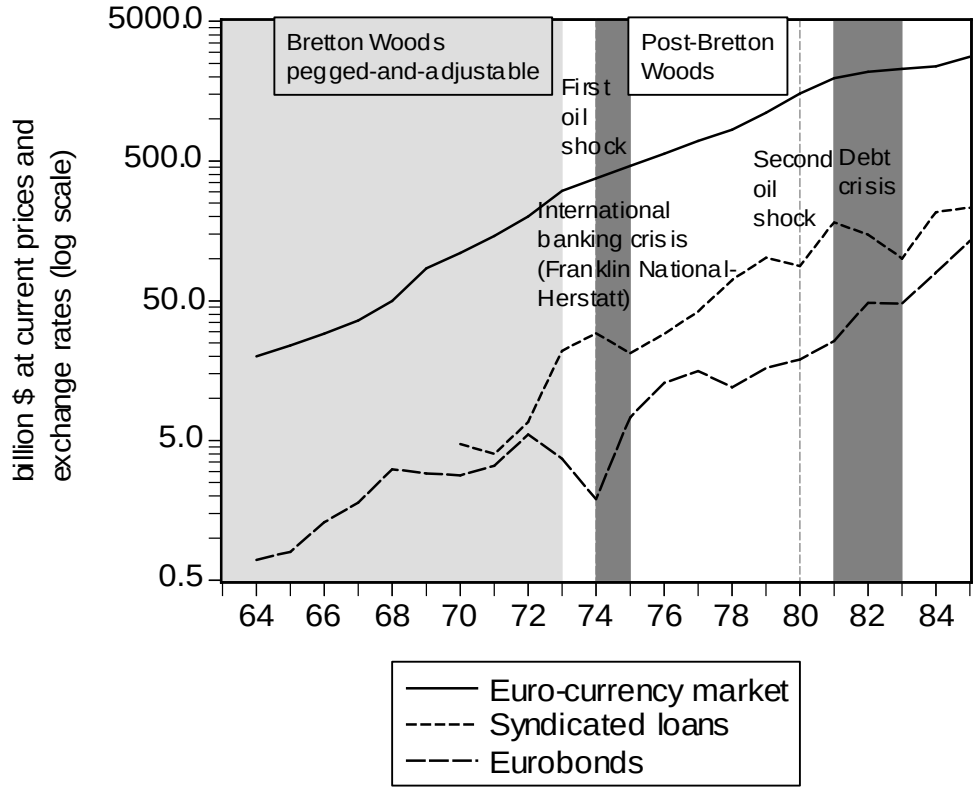
NOTE "d"=days; "m"=month; "y"=year.
[1] year-average.
Source: Gibson 1989; data from Bank of England Quarterly Bulletin.

Figure 1
Euro-dollar and interbank shares of total Eurocurrency market



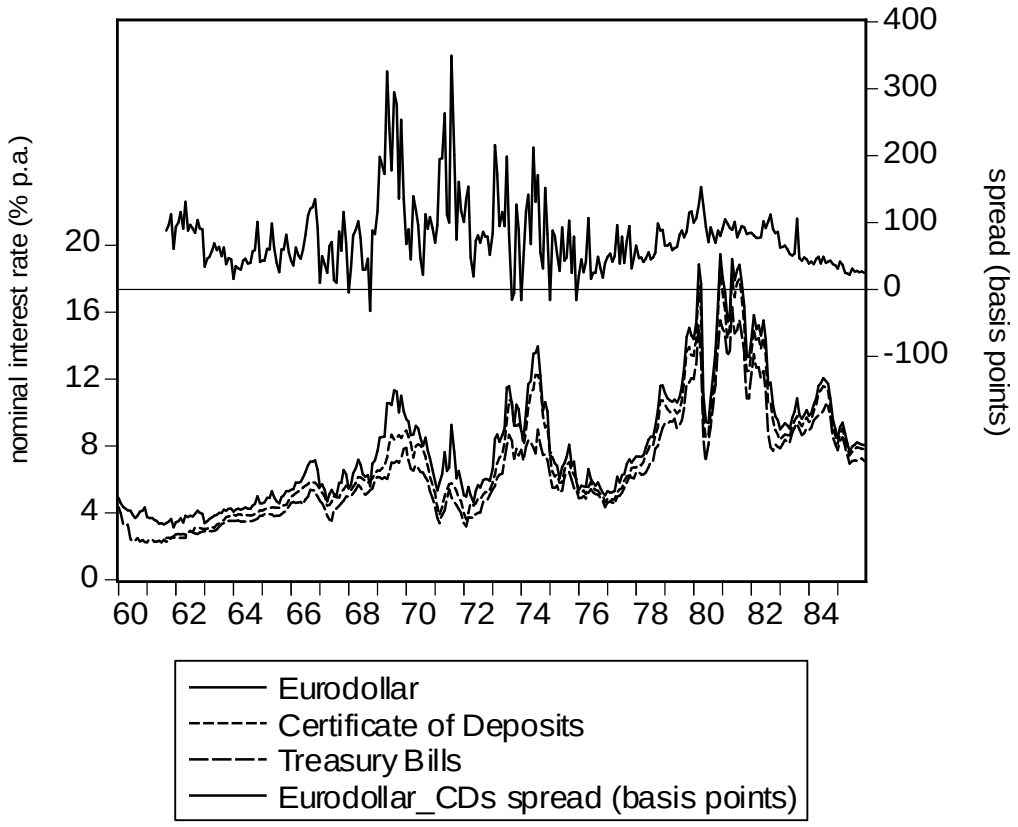
NOTE. Dollar-denominated deposits and interbank liabilities as % of estimated gross size of all Eurocurrencies. Source: Sarver 1988. Data from Morgan Guaranty Trust.

Figure 2
Emergence and expansion of Euro-markets, 1964-1985



NOTE.
Eurocurrency market: estimated gross size of Eurocurrency market including interbank deposits (foreign currency liabilities of banks from reporting countries vis-à-vis non residents: year-end amount outstanding). Source: Sarver 1988. Data from Morgan Guaranty Trust. Syndicated Euro-credits, Source: Fisher 1988. Data from Euromoney; not available prior to 1970. Eurobonds -Source: Fisher 1988. Data assembled from statistical sources not always consistent.

Figure 3
Eurodollar and US money market rates



NOTE. Monthly nominal interest rates (% p.a.) of 3-month Eurodollar deposits in London, US commercial banks` 3-month certificates of deposits (CDs), and 3-month US Treasury Bills.
Source: OECD Monetary and Financial Statistics.

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FOOTNOTES

[1] Merton 1995: 463.

[2] Roubini and Sala-i-Martin 1995

[3] Ross 1989: 541.

[4] Machlup 1970. For a history of the early period of the Eurodollar market and a profile of its institutional features see Einzig 1964; Clendenning 1970; Bell 1973; Little 1975; and Mendelsohn 1980.

[5] Dufey and Giddy 1978: 2.

[6] Bryant 1983: 14.

[7] Marston 1976 provided evidence that bank arbitrage tended to keep Eurocurrency interest rates at interest rate parity with respect to forward exchange rates—i.e. non-dollar Eurocurrency deposits can be regarded as covered Eurodollar deposits (ie, Eurodollar deposits covered forward by swap contracts). A forward swap involves a purchase of spot Dollars against non-dollar currency and a sale of Dollars forward.

[8] Maturities were ranging from call to 1 or more years, the standard maturity being 3-months. Minimum size of each deposit was in the region of US$ 1 million. It is worth emphasising that the prefix ‘Euro’ is partly misleading. Although banks dealing with Dollar deposits outside the USA were for the most part located in Western Europe, a sizeable Euro-Dollar business was carried out from the very beginning by banks in Canada, Japan and the Middle East (i.e., Beirut financial centre). In the 70s the importance of other Eurocurrency financial centres outside Europe, such as Singapore (the "Zurich of Asia", where the bulk of the Asian-Dollar market was located), Hong Kong, Manila, and off-shore centres (Nassau, Cayman Islands, Panama, Bermuda) grew rapidly.

[9] Early reference to such transactions are in Einzig 1964: 3-4; for a historical analysis see Cottrell 1989. These transactions can be regarded as the most straightforward historical antecedents of the Eurocurrency system, but their scale was too small to influence foreign exchange and money markets in London and New York, or the international financial system.

[10] Holmes and Klopstock 1960; and Altman 1961 and 1963. The latter reported information from discussions held with central and private bankers in all the main financial centres of Europe.

[11] On transaction costs in the Euromarkets, Agmon and Barnea 1977; Frenkel and Levich, 1975 and 1977.

[12] Apart from allowing banks to economise substantially as to information and transaction costs, especially in periods of increased volatility of interest rates, brokers make possible to banks to approach the market on their own terms and to maintain anonimity in the early stages of the dealing (particularly helpful for the placement of deposits of unusual size and maturity). See BIS 1983: 7-9.

[13] The well known story goes that since the late 1940s Soviet block countries (including China) moved their dollar balances from New York to banks in London and Paris in order to avoid any risk of "freezing". The same happened with dollar balances of Arab countries after the Eisenhower administration freezed assets held in the USA by countries involved in the Suez episode of 1956.

[14] On the BIS role see Toniolo 2005: 452-55.

[15] See Battilossi 2002 and Ross 2002. Merchant banks and overseas banks used to claim the merit for having pioneered the Eurodollar business in the late 1950s (see Fry 1970 on George Bolton, chairman of Bolsa), and indeed Eurodollar dealing was known in the City's financial circles as "the merchants market". However Schenk 1998 provided evidence of taking Dollar deposits by one British clearing bank at least since the mid-1950s.

[16] Mayer 1985. Cross-border business implied banking in domestic currency with non-residents (eg, British banks using Sterling facilities to finance international trade of European customers). Cross-currency business was banking in foreign currencies with residents (eg, Italian banks using Dollar facilities to finance international trade of their domestic customers).

[17] McKinnon 1977: 4-5.

[18] Bryant 1983: 10-11. Data assembled by Bryant for 15 industrial countries show that Eurocurrency assets (claims on foreign residents denominated in foreign currencies) accounted for 56 per cent of total claims with international characteristics in the early 1980s.

[19] In November 1974 the nine levels of tiering included: 1) four prime US banks; 2) rest of top US banks; 3) second-tier US banks from major financial centres; 4) Canadian and some minor West Coast US banks; 5) London clearing banks and

regional US banks; 6) wholly owned US banks in Europe; 7) consortium banks; 8) Italian banks; 9) Japanese banks. See Sarver 1988: 28-30.

[20] This is measured as the difference between gross and net size of the market estimated by *World Financial Markets*, published by Morgan Guaranty Trust of New York.

[21] Such figures need some qualifications, in that they do not include only pure interbank activity, but also transactions that are not arranged in the interbank money market (such as credit granted among banks) and, as mentioned earlier, "inter-office" business. Moreover the magnitude of interbank relative to non-bank business is overestimated by the fact that non-bank transactions giving rise to interbank deals may not appear on the banks' balance sheet (such as in the case of a forward foreign exchange sale to a non-bank customer, while the bank may hedge the risk arising from the forward sale through lending and borrowing in the interbank market). See BIS 1983: 17-22. A different study (Ellis 1981) found a rather constant percentage, around 70%, for the period 1973-1980.

[22] Some large, multinational banks were reported to privilege inter-office business as a general rule, resorting to the interbank market only when they can obtain a better rate. Other banks concentrated their interbank business at a few dealing branches or offices located in major financial centres (to which other branches direct funds), in order to centralise control of the business. BIS 1983: 15-17.

[23] Most Eurocredits (over 90 per cent) used to be denominated in dollars, at least initially, in the 1960s and 1970s. However in some cases contracts gave borrowers the right of choosing other currencies for each rolling-over period, provided that banks were able to obtain the currencies in the market for the maturities required.

[24] In fact Eurobanks committed themselves to provide borrowers with a succession of short-term loans over a medium-term period: see Mendelsohn 1980: 71-86. For financial innovations related to the emergence of the Eurocredit market, see Dufey and Giddy 1981.

[25] Eurobonds were bonds mainly denominated in dollars and deutsche marks and placed by international bank syndicates with investors in different European countries. See Kerr 1984; Fisher 1988.

[26] This proved especially true when low short-term interest rates in the Eurodollar or Eurocurrency markets created wide yield curves and large profit opportunities on Eurobond investments. Banks were therefore induced to borrow extensively in the short-term market to finance voluntary their voluntary holdings of Eurobond.

[27] BIS began to publish regular statistics on the Eurodollar and Eurocurrency markets in 1964. Originally the BIS data included in the Eurocurrency aggregates only claims and liabilities in foreign currencies vis-à-vis foreign (usually both bank and non-bank) residents of banks in the Group of Ten countries. Estimates provided by Morgan Guaranty Trust of New York since the early 1970s are more comprehensive as include some non-European centres.

[28] Such is the meaning of the "net" measures of international banking operations provided by the BIS and other financial institutions. For a detailed illustration of Eurocurrency statistics and related methodological problems in measuring Eurocurrency markets, see Dufey and Giddy 1978: 21-34, and Johnston 1983: 35-55.

[29] In evaluating the rapid growth of banks' international liabilities and claims, the effects of a secular acceleration of inflation since the 1960s, reflected in a sharp rise in the nominal value of funds intermediated by banks, have to be taken into account. Pecchioli (1983): 16, argues however that the expansion in the volume of international business has been on average markedly greater than the rise of global measures of inflation.

[30] A different and hotly debated issue in the 1960s was whether there was a causal relationship between the continued deficit of the US balance of payments and the Eurodollar growth. Theoretically however the causal link has proved tenuous at best; moreover, econometric investigations have demonstrated that the rate of Eurodollar growth was not related to trends of the US payments deficit. Nonetheless the US balance-of-payments deficit explanation re-emerged after the 1973 oil shock: see Frydl 1982: 14-15.

[31] For a critical review of the multiplier debate, see Dufey and Giddy 1978: 135-154; Mayer 1979; Johnston 1981: 8-27; and De Cecco 1987.

[32] Theoretical foundations of the “new view” were provided by classical studies by Gurley and Shaw in 1960, and Tobin in 1963. A concise review is in Spencer 1986: 15-30. For an application to Eurocurrencies, see Crockett 1976 and Freedman 1977.

[33] Eurodollar deposits cannot be used as means of payment (cheques cannot be drawn on them). This is the fundamental reason why Eurobanks relied on clearing balances (demand accounts) held with New York banks for making and accepting payments.

[34] Whether investors, by adjusting their portfolio of domestic and foreign assets, conform to a stock-adjustment or a flow adjustment model is a matter of debate. See Johnston 1983: 87-98.

[35] Dufey and Giddy 1978: 107-130; see also Niehans 1982: 17-19.

[36] Bryant 1987: 62-64.

[37] Swoboda 1968 and Makin 1972; see also Johnston 1983: 76-81.

[38] Oil-exporting countries and other non-oil developing countries showed a marked preference for Eurodollar deposits as investments with high degree of liquidity and shorter maturities (not available from US banks). See Johnston 1983: 144-159.

[39] Bryant 1987: 72-73, related this result to the Goldsmith-Gurley-Shaw proposition that financial intermediation tends to grow faster than output in the earliest stages of economic development, suggesting that this proposition may be validly extended to the world economy as a whole.

[40] Dufey and Giddy 1978: 133-135; Johnston 1983: 86-87; Bryant 1987: 66-68.

[41] See Forsyth 1987: 144-149; Helleiner 1994: 83-84; and Burn, 1999. In domestic banking, a cartel arrangement set interest rate ceilings on deposit and loan base rates (linked to Bank rate), while the Bank of England imposed quantitative and qualitative limits on banks' sterling portfolios.

[42] For a description of national capital controls and their impact on international capital flows, see Mill 1972; OECD 1978; Artis and Taylor 1989 (for the UK); Dooley and Isard 1980 (for West Germany); and Marston 1995: 45-69.

[43] In the form of either costs of transferring funds or opportunity costs of keeping funds invested in domestic assets at lower returns.

[44] For a detailed institutional analysis of the Eurobond market, see Kerr 1984 and Fisher 1988.

[45] As in the case of US banks overseas branches accepting Eurodollar deposits from and making Euroloans to foreign subsidiaries of US corporations; or Luxembourg-based branches or affiliations of German banks doing Eurodollar business with foreign subsidiaries of German companies.

[46] Before 1978 foreign banks in the USA were regulated only at state level and exempted from FED reserve requirements, interest rate ceilings and restrictions on interstate banking. In 1978 the International Banking Act gave foreign banks the same regulatory status as domestic banks.

[47] See Lees 1976 and Buttrill-White 1982.

[48] An analytical narrative of the invasion of US banks in London is provided by Sylla 2002. For a quantitative analysis, see Brimmer and Dahl 1975; Goldberg and Saunders 1980; Darby 1986.

[49] Regulation Q was an interwar regulatory device that imposed a ceiling on interest rates payable by banks on time deposits; it was applied also to CDs in the course of the 1960s. Deposits from foreign governments and international institutions were exempted. See Friedman 1975.

[50] Kane 1983: 28-50; De Cecco 1987. On the crucial relevance of the 1966 and 1969 credit crunches for financial innovation in the USA see Woynilower 1980.

[51] Helleiner 1994: 111-122.

[52] LIBOR is the London interbank offer rate, a compound average of "offer" rates in the London market.

[53] The existence of market imperfections – eg, whether Eurodollar rate adjusted more quickly to changing credit and market conditions than interest rates in the US domestic markets – is a matter of debate. For the capital control period (1963-1973), market segmentation makes difficult to detect the existence of market imperfections. For the post capital control period, Dufey Giddy and Min 1979 supported the view that Eurodollar rates were more sensitive to changing market conditions. Kaen and Hachey 1983 found no evidence of the presence of such phenomenon and tended to deny any unidirectional causality from the Eurodollar to the US money market. They suggested that a reasonable position would be that domestic markets responded relatively more quickly to changes in external market conditions than vice versa.

[54] For a discussion of short-term interest-rate determination in the Euromarkets and empirical analysis, see Dufey and Giddy 1978: 48-106; Johnston 1983: 110-143; and Gibson 1989: 68-104.

[55] Arbitrage includes asset and liability portfolio adjustment in response to changes in relative yields or costs, as well as transactions of simultaneously borrowing cheap funds and relending them at a higher return.

[56] Bryant 1987: 64-66.

[57] Marston 1974; Dufey and Giddy 1978: 130-135; Gibson 1989: 49-67. The interest parity theory states that, under conditions of equilibrium and efficient markets, the differential between interest rates on assets of the same degree of risk and denominated in different currencies will equal the forward discount/premium between the two currencies. See Frankel and Levich 1975 and 1977; Marston 1995: 70-104.

[58] Argy and Hodjera 1973. Financial integration is defined by the sensitivity of capital flows to interest rate changes, as well as by the portfolio stock adjustment caused by such flows. For a review of different approaches to financial integration and efficient markets, see Gibson 1989: 33-40.

[59] Empirical estimations are in Frenkel and Levich 1975 and 1977; Agmon and Barnea 1977.

[60] Basic condition for such cross-currency arbitrage was the absence of an adverse forward exchange rate of the domestic currency vis-à-vis the dollar, which could offset partially or totally the nominal differential in favour of the Eurodollar. Investors with liquid funds denominated in domestic currencies usually invested in Eurodollar deposits on a covered basis, i.e. by purchasing a forward exchange contracts to cover against the exchange risk.

[61] While non-banks are supposed to be stock-adjusters to changes in interest rates, banks are regarded as flow-adjusters, that is much more interest sensitive. Empirical estimates of arbitrage margins in Kreicher 1982 and Marston 1995: 53-57.

[62] Frydl 1982: 13.

[63] Bank holding companies were established in order to circumvent regulation on liabilities banks were allowed to issue: see Hester 1981. Although outward arbitrage usually expanded a bank's balance sheet, this was not an absolute necessity. Domestic

funding could also be used to replace maturing Eurodollar interbank liabilities, leaving the balance sheet's size unchanged.

[64] Excessive borrowing in the domestic market could however offset incentive to arbitrage by lowering a bank's credit standing, thus raising its funding costs. See Khambata 1986: 159-162.

[65] Formuzis 1973; Marston 1974.

[66] See also Marston 1995: 50-57.

[67] A discussion on the sovereign risk and jurisdictional issues related to Eurodollar (and Eurocurrency) banking is in Dufey and Giddy 1984: 577-588. On the 1974 crisis, see Kane 1983: 116-125.

[68] For a legal discussion and historical background of such issue see Heininger 1979.

[69] On co-operation among central banks in supervising international banking and the ”Basle Concordat”, see OECD, 1985: 48-72. See also Dufey, Giddy and Min 1979.

[70] See Kreicher 1982: 10-23; and Johnston, 1983: 110-142. On the learning-curve and the information effect, Dufey and Giddy 1978: 54-55.

[71] McKinnon 1977: 17-18; Davis 1979: 82-86.In same case, banks engaged in deliberate position taking based either on pure arbitrage (commanded by covered interest differentials) or speculation (expected change of interest rates and foreign exchange rates: eg, by riding the yield-curve to profit from anticipated interest rate movements; or by performing currency arbitrage to profit from anticipated variations of exchange rates).

[72] Kane 1983: 101-103. See also Heinevetter 1979.

[73] For a detailed discussion of available data on maturity mismatching in the Eurocurrency market, alternative methodologies and a review of existing literature see Gibson 1989: 146-159. His results for the period 1973-1985 are broadly consistent with previous studies. It is worth mentioning that Bank of England data are likely to contain a disproportionate amount of interbank data as a consequence of the importance of London as an interbank centre. As maturity mismatching in the the interbank market is considered to be smaller than average in the whole Euromarkets, figures might therefore underestimate actual mismatching.

[74] The expression is used by Bingham 1985.

[75] Harrington 1988: 46-48.

[76] An overall assessment in OECD 1985: 24-37. For a general review of asset and liability management, see Harrington 1987 and Wilson 1988.

[77] Kane 1979; Hester 1981.

[78] Sarver (1988): 207-221.

[79] BIS 1983: 9-17; Johston 1983: 98-103.

[80] Mishkin and Strahan 1999

[81] Johnston 1980; Ball and Davies 1984; Campbell 1984.

[82] Frankel 1984; Bullock 1987. A general review of financial innovations and their impact on banks' asset and liability management and the international interbank market is provided by BIS, 1986; Harrington 1988: 43-81; and BIS 1992.